

HOW TO MAKE AND USE SPREADING BOARDS FOR INSECTS

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The wings of an insect are often its most characteristic feature and should, in well mounted specimens, be clearly visible. Since many kinds of insects die with their wings so closed or folded as to obscure their characters, it is necessary to spread them artificially. This is particularly true of moths and butterflies, but damsel-flies, stone-flies, and members of

some other orders may be handled in a similar manner. Such creatures as beetles, grasshoppers, and true bugs, whose hind wings are covered by the forewings save when in flight, if spread at all, may be spread on the left side only. The other pair of wings remains in the normal resting position. Properly pinned and spread insects of several orders are shown in fig. 1.

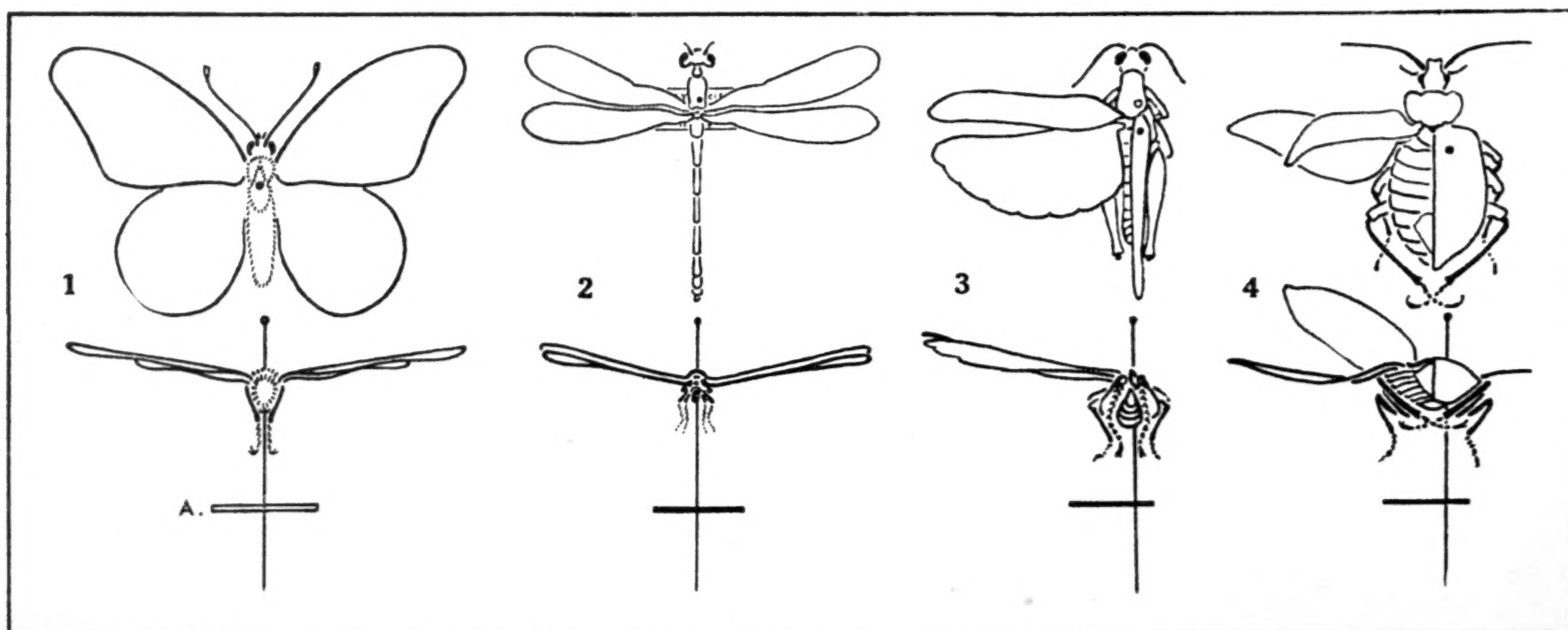
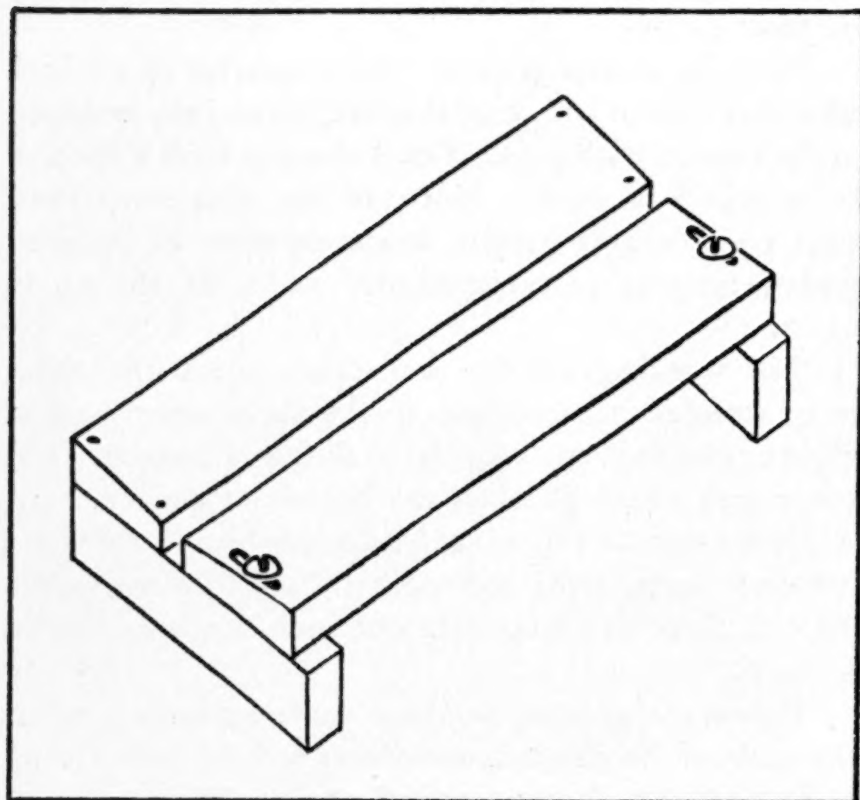


Fig. 1. Insects which have been mounted by the use of spreading boards, top and rear views, showing the position of the pin in the specimen and of the locality label on the pin.

1. Butterfly. A. is the label.
2. Damsel-fly.
3. Grasshopper, showing the traditional thoracic

position of the pin, as well as the preferred position in the right forewing.

4. Beetle.



Although it is possible, with patience and ingenuity, to spread insects without special equipment, the process is made quicker and easier by the use of a spreading board, upon which the wings may be extended. This is actually two boards mounted with enough space between them to contain the body and legs of the insect. Fig. 2 shows a commercially made spreading board with groove of adjustable width. If you have not many specimens to mount, you would do well to buy one of these from a scientific supply house; but if you are planning a large general collection, it would be better to make for yourself a number of spreading boards of assorted sizes.

The dimensions of spreading boards may vary. Those given here are large enough to contain our biggest local insects, and small enough to handle easily. For very little species, they could be much

Fig. 2. An adjustable spreading board.

narrower; for tropical giants, they might have to be wider. It is desirable to base the measurements upon the largest board that you will need, and to have the pieces of all the boards cut to those measurements by the lumber yard or wood-working shop where you buy the materials. The minor alterations necessary in the smaller boards can be made with a hand saw after they are assembled.

The two principal pieces of each spreading board should be of very soft wood. California redwood and eastern white pine are excellent, but western white pine is too hard. It does not matter what wood is used for the smaller pieces.

MATERIALS FOR ONE SPREADING BOARD

Two pieces of soft wood, 12" x 3" x $\frac{5}{8}$ " at one edge and $\frac{3}{8}$ " at the other, as shown in fig. 3. This slope of

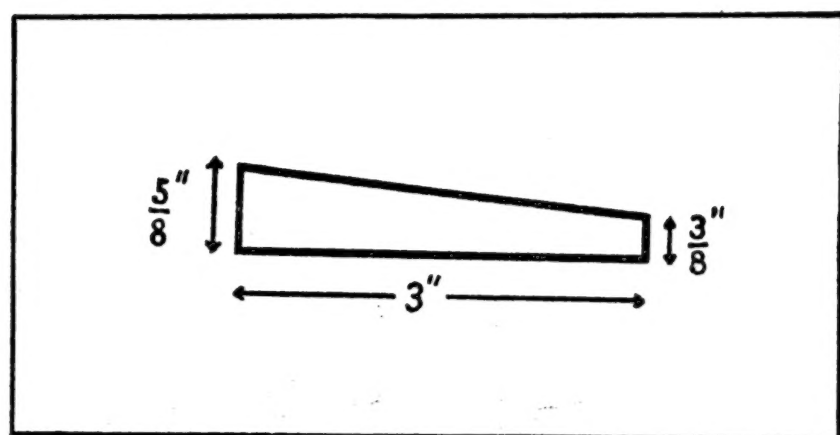


Fig. 3. End of one of the two principal pieces of a spreading board.

the top surface of the boards gives the wings of the mounted insects an upward tilt which tends to offset a natural tendency of the wings of pinned specimens to droop.

Two pieces of wood, 7" x $\frac{3}{4}$ " x $\frac{1}{2}$ ". The thickness of these pieces combines with that of the narrower edge of the principal boards to determine the height of the specimens upon their mounting pins, and is therefore important. The other dimensions may vary a little, if desired, although their length should at least equal the total width of the completed article, and their width must be great enough to receive several small nails without splitting.

Three pieces of wood, 12" x $\frac{3}{4}$ " x $\frac{1}{2}$ ". The length of these pieces is their only significant measurement, but the cabinet maker who cuts the pieces would probably like to make all the small ones from the same strip of material.

One piece of cork or balsa wood, 10 $\frac{1}{2}$ " x 1" x $\frac{1}{8}$ " approximately. Balsa wood strip of suitable size is carried by many hobby-craft stores, and it is sometimes possible to obtain sheet cork from a concern dealing in linoleum and similar floor coverings.

TOOLS AND SUPPLIES

Small-headed wire brads, some one inch and some three-quarters of an inch in length.

Carpet tacks, about a quarter of an inch long.

A little glue.

A hammer.

A small saw.

ASSEMBLING THE SPREADING BOARD

Place the two seven-inch strips, one broad surface down, parallel to each other and a foot apart. On top of these, and at right angles to them, put one of the two wide boards. Match the corners at the thick edge of the board, and nail the pieces together as shown at the top of fig. 4. Use the one-inch brads at the outer corners, the three-quarter inch elsewhere.

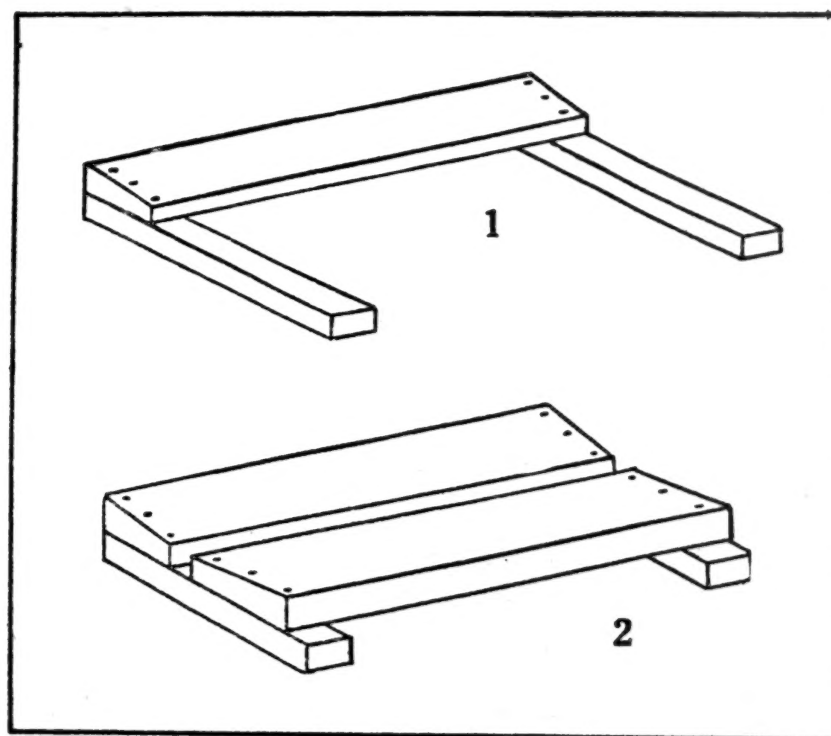


Fig. 4. First steps in assembling a spreading board.

Lay the second board parallel to the first, with the thin edges facing each other and enough space between them to accommodate the body and legs of an insect. Fasten with brads, as shown at the bottom of fig. 4. Grooves $\frac{1}{4}$ ", $\frac{3}{8}$ " and $\frac{1}{2}$ " in width will probably be most useful.

Turn the assembly over. For a quarter of an inch on either side of the central space, spread the bottoms of the boards with glue. Cover the gap with a strip of balsa wood or cork. Since, in use, this strip must bear considerable strain, it should also be secured with a number of large-headed tacks, as shown in fig. 5.

Still working on the underside, place the three long wooden bars on top of the short ones, and at right angles to them, parallel to the large boards. The outer pair should match the boards at the corners, while the middle one must lie directly above the space between them, over the cork or balsa wood strip. Nail all three in place with one inch brads as shown in fig. 6.

Unless the groove has been made extremely wide, the ends of the short cross-pieces will be protruding at one side of the spreading board. With a small

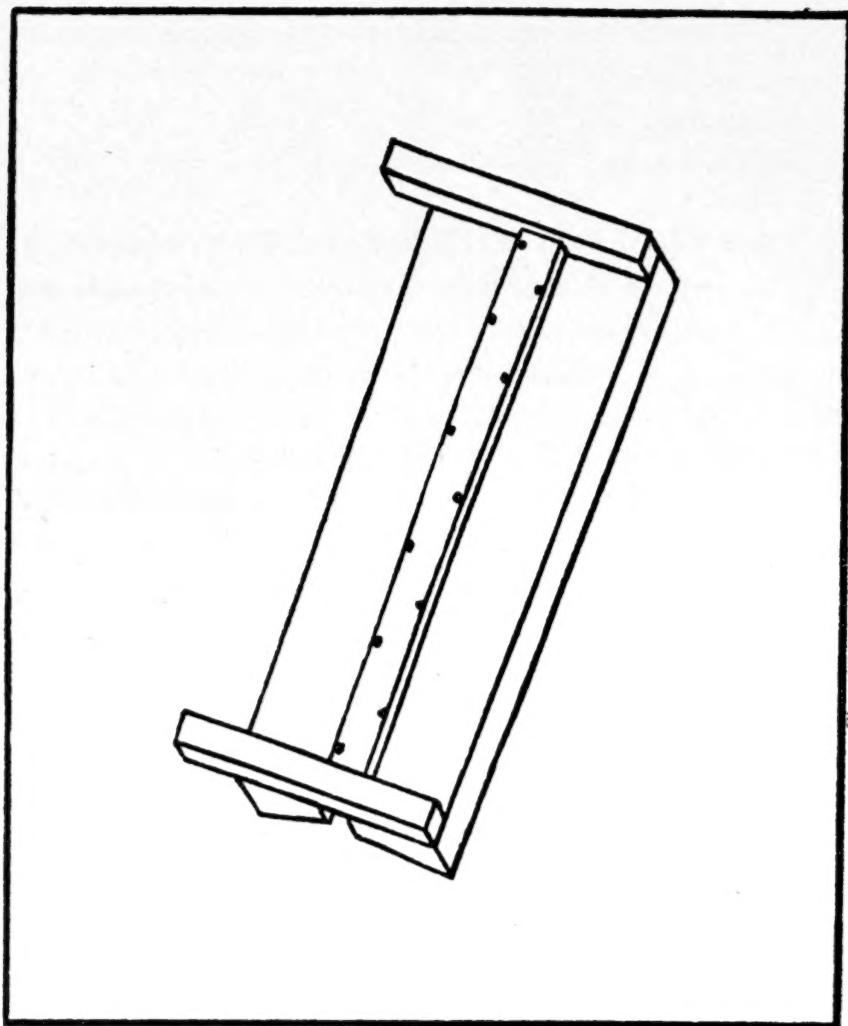


Fig. 5. Position of the balsa wood strip on the under side of a spreading board.

hand saw, cut these off as close as possible, and the board is finished.

USING THE SPREADING BOARD

Every experienced spreader of insects develops individual variations upon the basic idea, which is to extend the wings of the specimen flat upon the board, and keep them there until dry. The method here

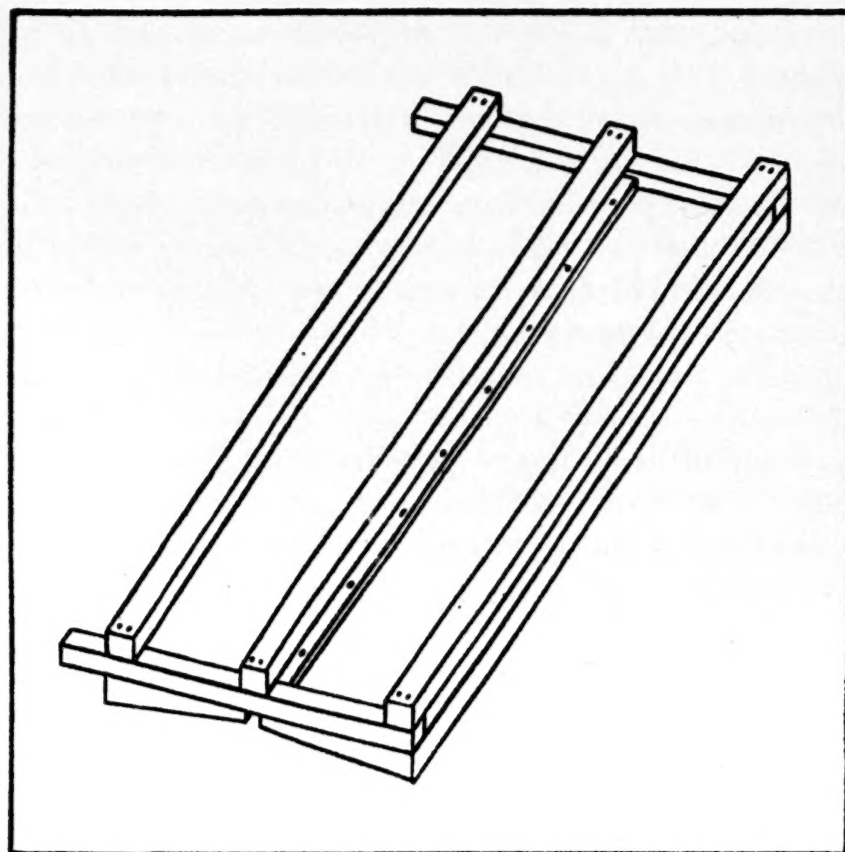


Fig. 6. Last step in assembling a spreading board.

described is the one in use at this Museum. It produces specimens of good quality more quickly and with less equipment than any other system with which we are acquainted. The necessary tools are illustrated in fig. 7. They are:

1. Glass headed furriers' pins, sometimes sold as veil pins. You will need about ten for each of the specimens to be mounted at one time. They can be bought by the pound from dealers in commercial sewing equipment. Ordinary dressmaker's straight pins will serve the same purpose, but are harder on the hands of the user.

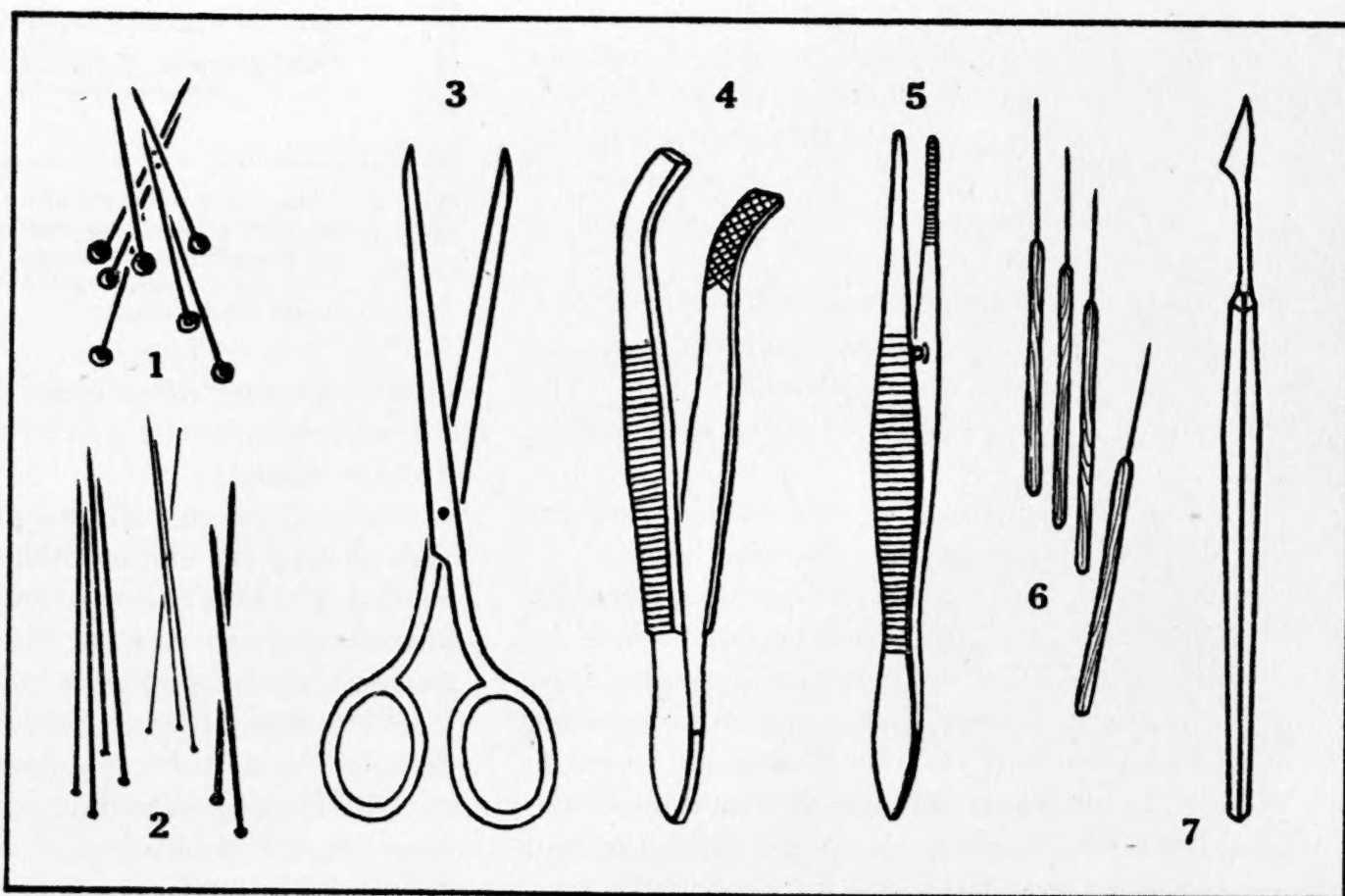


Fig. 7. Tools used in spreading insects.

1. Glass-headed pins.
2. Special steel insect pins.
3. Scissors.
4. Pin forceps.
5. Pointed forceps.
6. Spreading needles.
7. A lancet for Skippers.

2. Special steel insect pins. These usually come in packages of one-hundred or five-hundred, and are of uniform length but variable thickness. The higher the number, the thicker the pin. Number three is probably the most generally useful size, but ones and fives are also valuable. Insects too small for size one pins must be dealt with by special methods, as very fine pins bend too readily to be practical.

3. A pair of scissors, for cutting strips of paper.

4. A pair of broad-ended, rough-faced forceps, for grasping insect pins.

5. A pair of slender, pointed forceps, straight or curved, with which to hold the specimens.

6. Spreading needles. Make these yourself, using number eleven or twelve sewing needles with match sticks for handles. The eye end of the needle should be thrust into the end of the match stick for about half the needle's length, by means of a pair of pliers. You may have to try several times before finding a match straight enough in the grain to endure this without splitting, but the resultant tool is better for its purpose than any you might buy. If you plan to mount one specimen at a time, you will need four of these needles, but when spreading a large number of insects at once, you may have to use four for each specimen on half of the board, or about a dozen, and in case of a series of stiff specimens, which require needles to remain in place until the insects have dried, four for each specimen in the lot.

7. A lancet, or broad bladed dissecting needle, for cutting the wing muscles of Skippers. Skippers are butterflies belonging to the family Hesperidae which may be recognized by the hooks at the ends of the antennae. Their wings are small, but so strongly muscled that they often cannot be spread without tearing unless the muscles are cut, as shown in fig. 8, by a small but deep longitudinal incision just under each wing. This operation is performed after the specimen has been pinned in the usual manner, as described below.

In addition to these tools, you will require some strong, tough paper, typewriter bond will do, and some stiff heavy paper or light index card. The papers must be large enough to make strips about seven inches long.

Dissecting needle, forceps, and insect pins are obtainable from dealers in scientific supplies.

Entomological specimens must be mounted while damp and pliable. If this cannot be done when the insects are fresh-killed, they must be softened by exposure to the saturated atmosphere of a relaxing box. The construction and use of relaxing boxes is discussed in Leaflet Four, and one of them is shown in fig. 9. Twenty-four hours in such a humidor will usually bring the driest specimens to workable con-

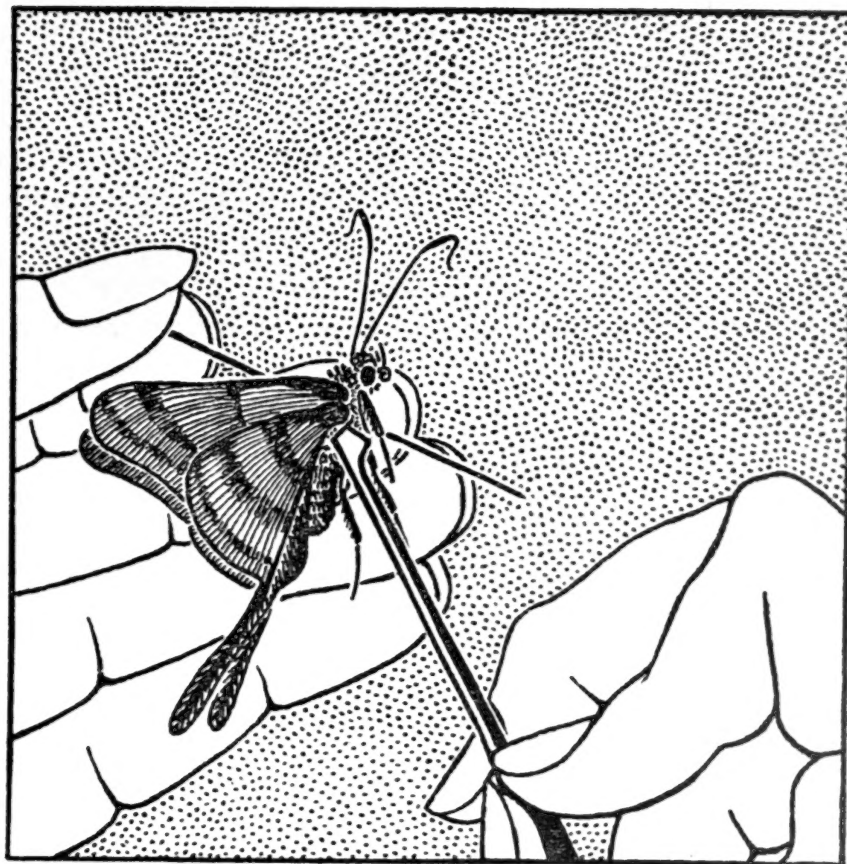


Fig. 8. Lancing a Skipper, showing method of holding the pinned specimen steadied by the middle finger, and position of incision to cut the hind wing muscles.

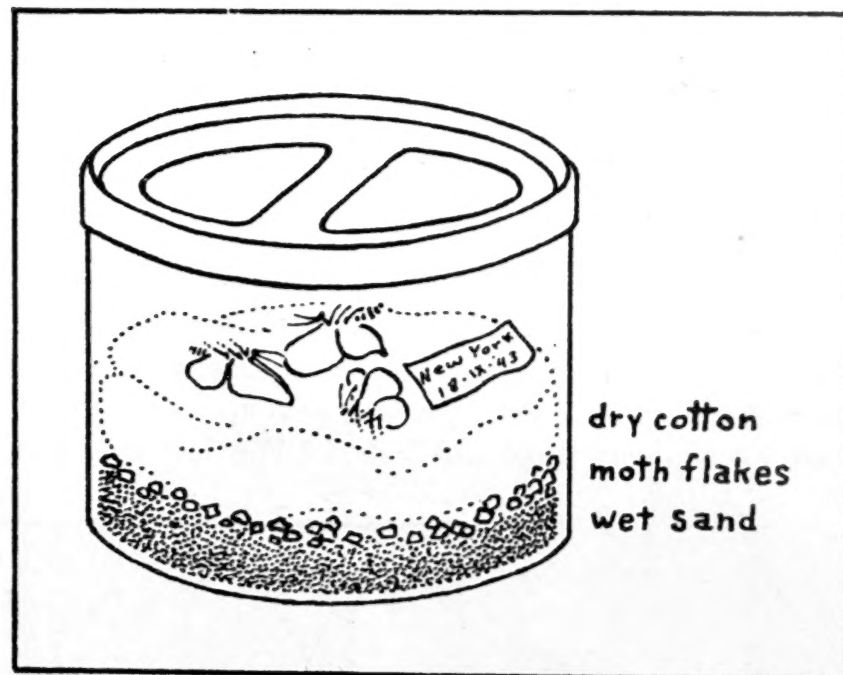


Fig. 9. Relaxing box made of an ice-box jar. In the bottom, an inch of soaking wet sand. Next, a tablespoonful of paradichlorobenzene to prevent mold. On top, a layer of dry cotton to protect specimens from contact with liquid.

dition, and even when mounting fresh specimens it is advisable to keep them in a relaxing box until you are ready for them.

For convenience in describing the spreading process, it will be assumed that the operator is right handed, and that the specimens are moths and butterflies of average size, to be mounted, in the usual scientific style, upon pins.

Select boards with grooves of widths suitable to the specimens to be mounted. For each board, if it is to be filled to capacity, make four strips of strong letter paper about seven inches long and three-sixteenths of an inch wide, called guide strips, and

four strips of light card of the same length but a quarter of an inch more than wide enough to cover the wings of one side of the largest specimen the board is to hold. When spreading a large mixed lot, it will save time if you make a quantity of strips of assorted sizes and keep them in readiness.

Lay out the pins, papers, and mounting tools where you can easily reach them, together with the relaxing box holding the insects. During the spreading operations, the board lies with one end toward the spreader, and the work progresses from the middle of the board toward that nearer end. When half of the board is filled, the position of the ends is reversed and the process repeated. Some workers raise the further end of the board by resting it on a book or shallow box.

Along each side of the central groove place two guide strips with their inner ends overlapping about three-eighths of an inch and fastened at the middle of the board with a glass-headed pin. This overlap appears in fig. 10. The outer ends of these strips will extend for a short distance beyond the ends of the board.

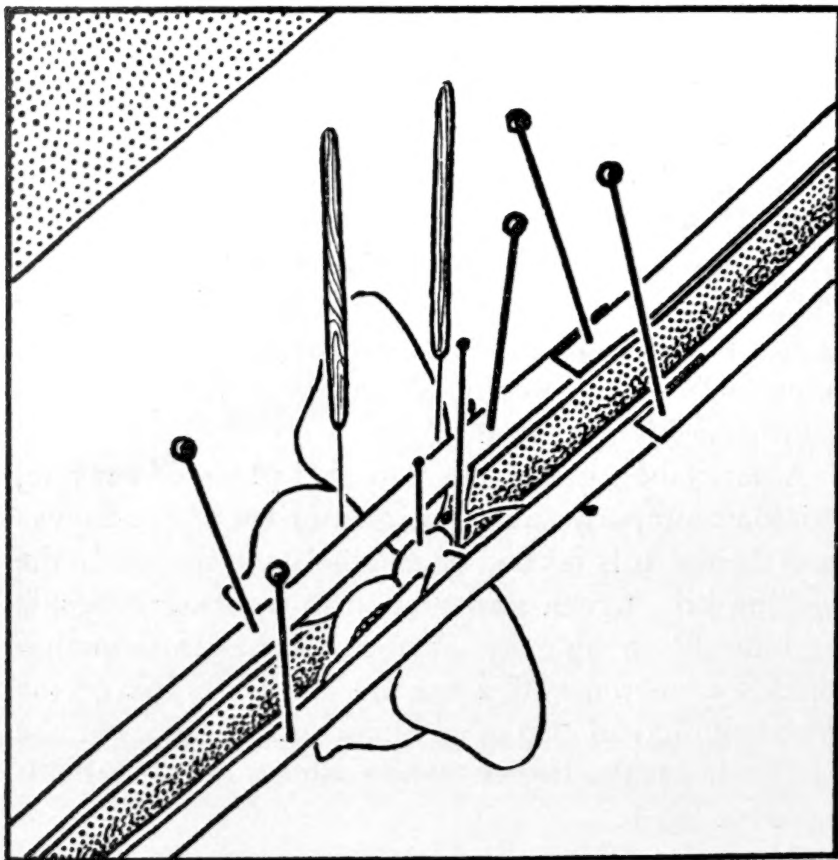


Fig. 10. Butterfly half spread.

With the pointed tweezers, remove a specimen from the relaxing box, holding it firmly by the thorax. Blow upon it gently from behind. If the wings flutter slightly, the specimen is soft enough to spread. Lay it upon the palm of your left hand, with the wings away from you and the head toward your right. With the points of the forceps parallel to the insect's body, seize it just under the bases of the wings, and pinch, which will cause the wings to open enough for you to see where to insert the pin. This should be a steel insect pin as large in diameter as the specimen can

accommodate without distortion. It serves as a handle for the insect, which ought never to be touched with the fingers, and which, when dry, will be extremely brittle. The pin, held in the left hand, is passed directly through the thorax, between the wings, from top to bottom and at right angles to the length of the body. It should protrude about $\frac{5}{8}$ " above the back.

Holding the point of the pin in the left hand, take the pin forceps in the right and, sliding them between the wings, grasp the top of the pin. Holding the specimen in this manner, body parallel to the groove and head away from you, push the point of the pin straight down through the cork strip at the bottom of the groove until it strikes the wooden bar beneath. So that the spreading of the wings may not be obstructed by the pins holding the guide strips, insert the first insect pin about an inch away from them. The body of the insect, with the legs folded close against it, should lie neatly in the middle of the groove. If the upper edges of the boards do not strike just below the bases of the wings, move the specimen up or down upon its pin until they do.

Lifting the right guide strip by its free end, slide it between the wings and use it to pull the wings of the right side down against the board. Put a pin through the strip just back of the wings to hold them out of the way while you work on the other side. This also may be seen in fig. 10.

Depress the wings of the left side by means of the left guide strip, kept taut between the thumb and forefinger, and held down by the third finger of the left hand. Taking one of the spreading needles in the right hand, use it to pull the left forewing forward until its rear margin is at right angles to the length of the body. This can be done without tearing the wing membrane if the needle point is inserted just back of one of the heavy veins near the front margin of the wing close to the guide strip. When the wing is in position, drive the needle through the membrane and into the board, to keep the wing from slipping back during the following operations.

If the pull on the wing causes the body to pivot on its pin, a second insect pin placed close against the body just in front of the right forewing and driven securely into the bottom of the groove should overcome the difficulty. Fig. 10 shows this restraining pin in place. The position of the antennae under the guide strips may also be seen in fig. 10.

Using a second spreading needle behind a strong vein, pull the left hind wing forward and fasten it in place, securing it further by a pin through the guide strip just back of its rear edge. The exact relative position of the fore and hind wings is a matter of controversy. Tradition demands that the margins of the two form a smooth continuous outline, but as so great an overlap conceals the often interesting characters near the upper front margin of the hind wing, the

position shown in fig. 1 is now more usual. One lepidopterist of this Museum advocates the unconventional but logical practice of mounting the wings on one side of the body in a reverse position, with the hind wing overlapping the forewing, thus revealing all its characters perfectly.

The wings of the right side are spread exactly as where those of the left. When both pairs are in position, cover the outer portion of each with a slip of paper cut from one of the cover strips and secured with a few flass-headed pins as shown in fig. 11. The pins ought not to puncture the wings, but should be placed close outside them. The narrow band of wing next to the guide strip where the spreading needles are inserted may safely be left uncovered. When the wings are firmly papered, remove the restraining pin, if any, and in most cases the spreading needles also. There are, however, some species so resistant to spreading that the wings will slip backward if the needles are removed before the specimen has dried.

If the abdomen of the insect tends to droop, prop it up with a pair of pins, crossed beneath it and driven into the sides of the groove. If it is cocked up, depress it with a similar pair of pins, crossed on top like those in fig. 11. Antennae too short to reach to the guide strips may also be arranged by carefully placed pins.

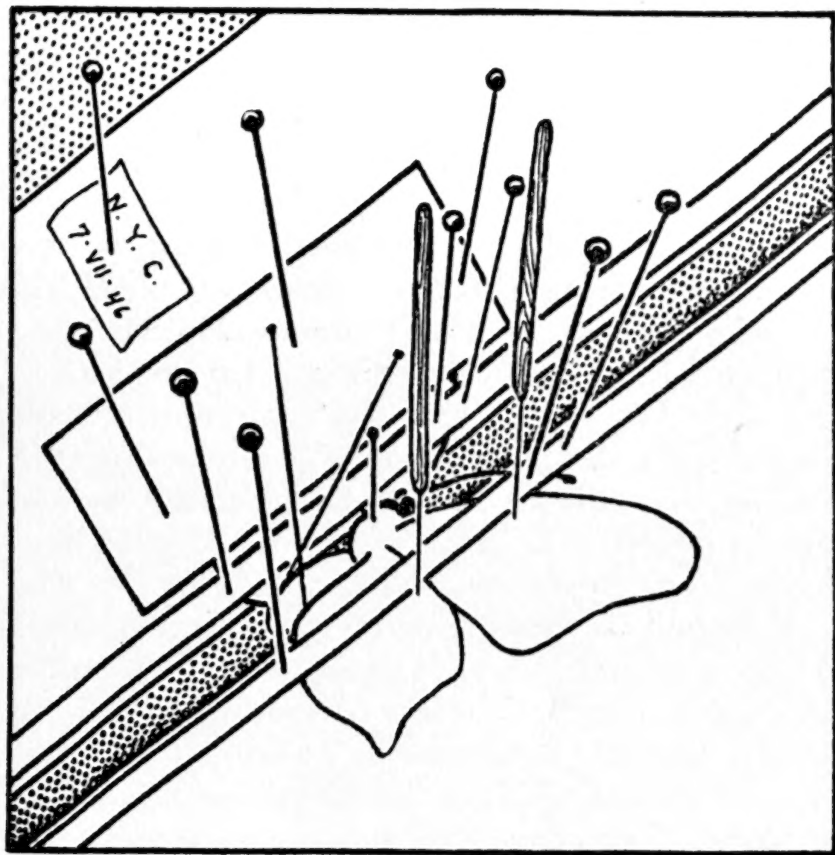


Fig. 11. Butterfly full spread, half papered. Note crossed pins depressing abdomen.

The second specimen is placed as close below the first as its size, when spread, will allow, and the third below the second. In the beginning, while you are working slowly, you had better paper each specimen individually. But, as your efficiency increases, you will find that you can spread half a board full, and paper them all with a single pair of cover strips, before the

wings of the first have dried enough to start curling at the tips. One board will usually hold four, six, or eight specimens, according to their size and your skill in estimating just how much space they will occupy when fully extended.

When filled, the spreading board should be stored in a warm airy place while the specimens dry. If the specimens have been previously dried, and relaxed, this will require from two days to a week, depending upon temperature, humidity, and the size of the insects. If fresh killed specimens are being mounted, they will take about three weeks, skippers and large moths not less than four weeks. In extremely damp climates forced drying in a slow oven may sometimes be necessary. It is never advisable to remove specimens from the board on a rainy day.

In taking specimens off the board, remove first all the guide and cover strips, and any supporting pins you may have used. Then lift the insects by pulling their pins straight up. If, despite precautions, legs, antennae, or even wings should be broken off, replace them at once with a little white shellac or transparent plastic cement well thinned with acetone. Torn wings can be repaired almost invisibly by drawing a small drop of such cement along each rent with the point of a needle, being sure to touch both edges with the adhesive. Detached fragments, such as antennae, too delicate to handle with forceps can be picked up easily by touching them with a small wet camel's hair brush. Should the broken part be too minute to replace neatly, glue it to a small slip of paper, and impale this on the pin beneath the specimen. You never know when you may need that very piece in making an identification.

A data label, giving the date and place of capture, should accompany each specimen or lot of specimens from the day it is taken. Such labels are shown in the relaxing box, fig. 9, and pinned to the board beside the butterfly in fig. 11. A copy of this information should be written with a fine pen and india ink on the smallest practical slip of stiff paper and fixed upon the pin that holds the insect. The position of this label is shown in fig. 1.

The name of the collector, also a part of the complete data record, may be included in the locality label or lettered on a second label, pinned beneath the first.

When spreading a considerable series of one species, try mounting some of the specimens up-side-down, so as to show the under surface of the wings.

If you wish to preserve your collection in Riker mounts, pressed between a sheet of cotton and a pane of glass, mount the insect up-side-down upon a flat board as shown in fig. 12. The fine pin used to hold the specimen to the board while the spreading is in progress should be removed as soon as the wings have been papered. The legs should be folded tight against the body and, if necessary, held there by

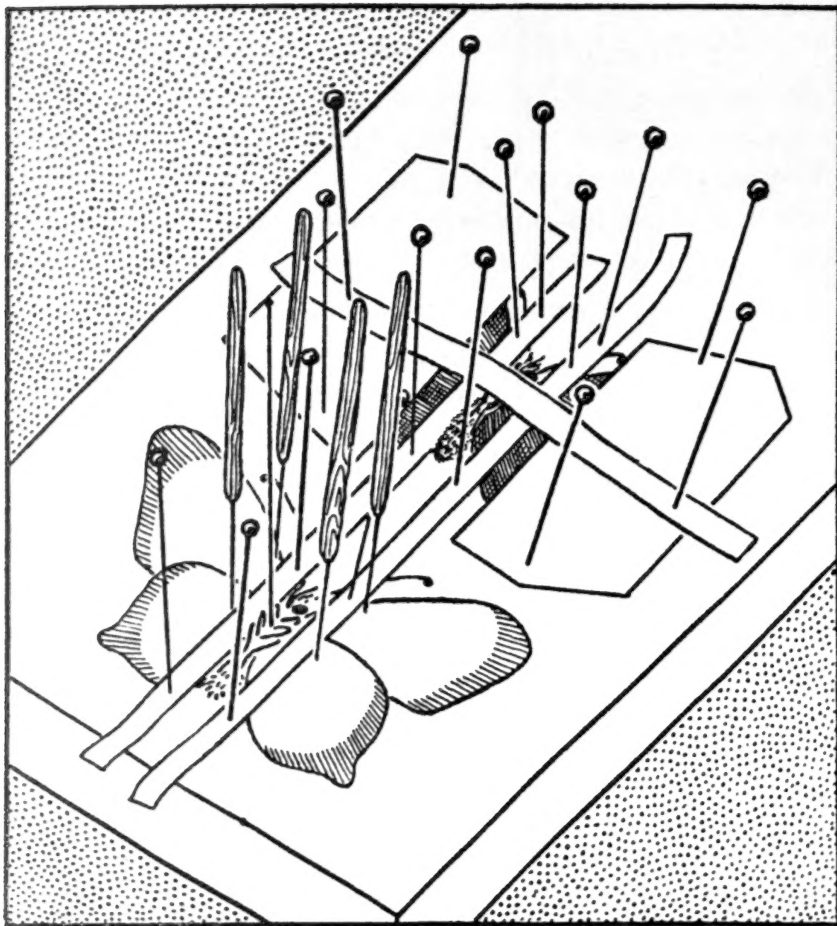


Fig. 12. Butterflies spread up-side-down on a flat board.

a strip of paper, as illustrated. Dragon-flies, even if they are to be pinned, may be mounted in the same fashion. The pin, however, should be left in position while the insect dries. When the specimen is removed from the board, the pin may be carefully twisted loose, withdrawn, and inserted from above through the same hole. A small drop of cement at the pin hole will prevent the specimen from turning on the pin, should the hole be a trifle too large for it.

Microlepidoptera, if too small to take number one pins, should be mounted upon "minuten nadeln." These extremely slender pins are too short and too delicate for easy handling, and must themselves be mounted upon a slip of cork or balsa wood which, in turn, is mounted upon an insect pin of standard size. A piece of blotting paper covered with strong onion-skin paper is equally satisfactory as a connective, and easier to produce in quantity. Cut a straight piece of white blotting paper half an inch wide and as long as is convenient. Cut a strip of strong, thin paper of the same length by an inch and a half in width. Cover

one side of the paper with paste and wrap it snugly around the blotter. When the paste has dried, slice the strip crossways with a razor blade and metal-edged ruler into pieces about an eighth of an inch wide. When using one of these, pass the insect pin through the blotting paper from edge to edge at one end, and the nadel bearing the insect at the other. Fig. 13 illustrates this method of mounting.

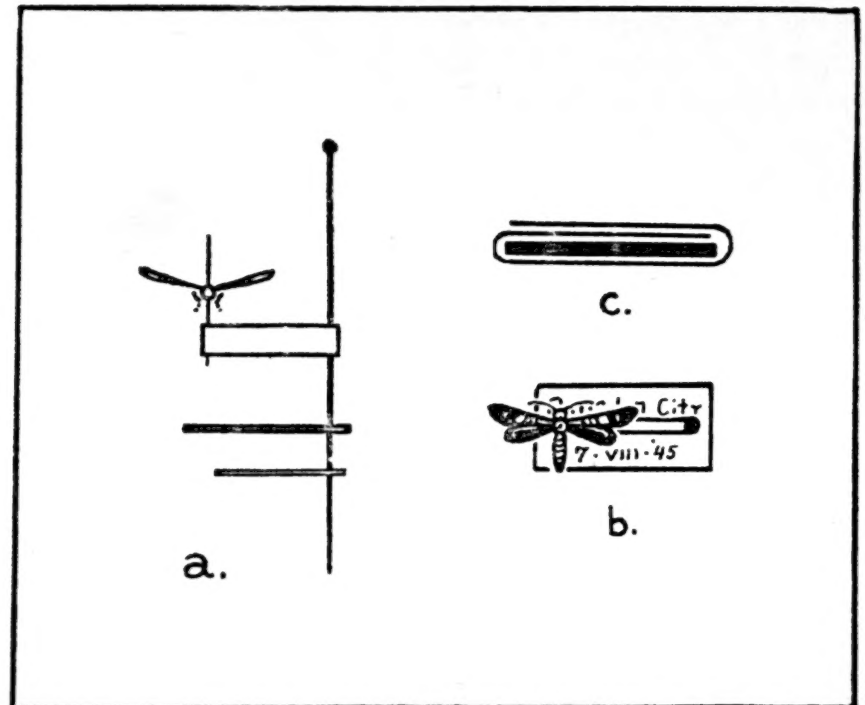


Fig. 13. A method of mounting Microlepidoptera upon minuten nadeln.

- a. Rear view. Note collector's label below locality label.
- b. Top view.
- c. Diagram of cross section of connective, showing how the onion-skin is wrapped around the blotting paper.

Insects of other orders are spread by processes essentially similar to those used for Lepidoptera. The small differences necessitated by the differing structure of the creatures will become obvious as you work. It is, for example, practically impossible to make the forewing of a beetle lie flat when extended at the side. It should, therefore, be lifted into flying position and held there by supporting pins, the guide and cover strips being passed beneath it. This results in the attitude illustrated in fig. 1. In this figure note also the positions of the pins in the various types of insects. The correct method of pinning hard-bodied insects of all kinds is discussed in Leaflet Number Four.

